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SCHOOL FINANCE REFORM IN POST EDGEWOOD TEXAS:

AN EXAMINATION OF REVENUE EQUITY AND IMPLICATIONS FOR

STUDENT PERFORMANCE

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SCHOOL FINANCE REFORM IN POST EDGEWOOD TEXAS: AN EXAMINATION OF REVENUE EQUITY AND IMPLICATIONS FOR STUDENT PERFORMANCE

by

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SCHOOL FINANCE REFORM IN POST EDGEWOOD TEXAS:

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This study examines the impact of school finance legislation brought on as the result of the *Edgewood* court decisions. It examines revenue neutrality, revenue equity, and their impact on student performance. Analyses of revenue equity conducted for this report indicate that equity is improved, especially when compared to those conducted in 1976 and 1986. Analyses that do not account for differences in educational costs, either due to educational need or to geographic differences in the cost of education, show a more equitable system than analyses that do account for these differences, suggesting an area for improvement in the state funding system. Per pupil property wealth has become less strongly associated with student performance as measured by the Texas Assessment of

Academic Skills, suggesting that these reforms may have had a positive impact on student learning among property poor school districts.

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CHAPTER 1

INTRODUCTION

Generally, Americans believe in equitable educational opportunity, with four out of five supporting equalized school funding, even if it means taking money away from wealthy schools, and almost 70 percent supporting limiting what wealthy districts can spend so poor ones will not be left behind (NPR/Kaiser/Kennedy School Poll, 1999), and they look to policy-makers to ensure access to equitable educational resources for all students. However, creating a funding mechanism that allows for the equitable and adequate funding of schools is not an easy task, and significant inequity has been documented both with respect to educational expenditures and student outcomes. As a result, almost every state has faced a court challenge of its school finance system, and the finance systems of close to half have been overturned (Farr & Trachtenberg, 1999). This study examines the impact of finance reform efforts that arose out of litigation in one state on both resource equity and student performance.

Background

The degree to which funding disparities ought to be of concern to policy-makers has sparked considerable debate over the past two decades. Some researchers point out that communities will look for ways to circumvent legislation designed to provide greater degrees of resource equity, and others doubt the

importance of financial resources for improving access to educational opportunity. However, there is evidence suggesting that the past few decades has produced improvements in resource equity in several sates, and the standards movement that accompanied school finance reform in many states now enables the examination of the impact of these efforts on student learning.

Some researchers maintain that communities will circumvent policies aimed at equalizing school funding in an effort to attain levels of education in line with their preferences. Addonizio (1997) argued that state imposed spending levels in Michigan are likely to result in unintended outcomes having to do with a disconnect between state imposed spending levels and consumer demand. He predicts that communities with higher demand for education will seek ways of spending resources outside of the public sector, by spending additional dollars on private school or by engaging in private spending on public schools through increased non-tax fundraising. There is some anecdotal evidence suggesting that a few Texas districts, faced with tax-rate caps, may have begun engaging in this kind of behavior. For example, the Highland Park Independent School District, a wealthy district outside of Dallas, is currently seeking donations from parents and community members to pay for a three percent teacher pay raise that is likely to cost the district $900,000 (Strickland, 2001). Careful study should accompany reform to ensure that policy results in intended equity gains.

Additionally, a significant amount research regarding the impact of educational expenditures on student achievement has been generated over the past thirty years, with some arguing that expenditures are irrelevant to student outcomes and others arguing that additional funds can have important effects (see, for example, Hanushek, 1989; Spencer & Wiley, 1981; and Hedges, Laine, and Greenwald, 1994).

Although there is still some controversy regarding the degree to which changes in resource allocation are important to improving student achievement, there is strong support for the idea that schools do not adequately serve all students, and students from low income backgrounds in particular (Ladd, 1996). In response, a host of reform efforts have been aimed at improving public schools. Among these have been significant changes in the way schools are funded, and some school finance reform has taken place or is taking place in the majority of states. Thompson and Crampton (2002) note that, in spite of a significant amount of investigation into the impact of litigation on educational resource equity, "the debate about the impact of school finance litigation is not now resolved and will continue to need thoughtful investigation well into the future."

Texas as a Case for Study

Texas was one of the first states to face a court challenge of its school finance system, and in response the legislature implemented significant reform. In

Edgewood, plaintiffs argued that property-poor districts' inability to generate revenue equal to that of other districts was in violation of Article VII, Sec. 1 of the Texas Constitution,[1] calling on the state to "establish and make suitable provision for the support and maintenance of an efficient system of public free schools."

Recently, Texas has been the subject of considerable controversy with respect to student performance and school reform, with some arguing that the strong accountability system put into place almost a decade ago resulted in improved student learning (see Grissmer, Flannagan, Kawata, & Williamson, 2000), and others arguing that these reforms have not produced significant learning gains and that improvements in Texas Assessment of Academic Skills (TAAS) scores do not necessarily translate into improvements on other measures of student achievement (Linn, Baker, & Betebenner, 2002). Further, who ought to get credit for improvements in Texas achievement scores has also been the subject of considerable debate (see Pogrow, 2002).

Currently, Texas is set to dramatically expand its accountability system, increasing both the number and difficulty of tests that students must pass in order to graduate from high school. Although some policy-makers have expressed concern that the new accountability system may raise the bar too quickly and may even push some students into dropping out, others maintain that similar concerns were expressed in 1993, and Texas schools managed to meet those challenges.

[1] Available online at http://www.capitol.state.tx.us/txconst/toc.html.

However, many Texas schools districts faced these challenges with considerable levels of new revenue as the result of school finance reform that took place almost simultaneously with new accountability provisions. A deeper understanding of the mechanisms that enabled most districts to improve performance on the TAAS is important as schools try to meet these new challenges and policy makers debate where to set the bar for passing rates on the newer Texas Assessment of Knowledge and Skills (TAKS).

Texas provides an excellent context for examining both resource equity and the relationship between resources and student achievement. First, finance reform in Texas has been in place for almost a full decade, giving reform efforts long enough to have impacted student achievement. This may not necessarily be the case in states whose finance systems underwent reform more recently. Grissmer and his colleagues (2000) note that the fact that significant changes in the behavior of individuals within organizations can take years, and that students' test scores in one grade are dependent on their performance in prior grades mean that changes in policy will result in "gradual, rather than dramatic, changes in [test] scores."

Second, Texas' 1040 independent school districts yield a sample with significant diversity with respect to both property wealth and student demographics. As of the 1999-2000 school year, Texas had 52 school districts in the poorest five percent on districts with taxable property wealth of less than

$62,415 per student, and yet the 52 school districts in the wealthiest five percent had taxable property wealth of over $631,432 per student, meaning that Texas' wealthiest districts have over ten times as much property wealth per student as its poorest.[2] Additionally, of Texas' nearly 4 million students, 14 percent are African American, 40 percent are Hispanic, 43 percent are white, and 49 percent are economically disadvantaged.[3] Finally, Texas has been using a statewide performance measure, the TAAS, since 1994, providing researchers with a longitudinal student performance database. This project will examine the impact of school finance reform on resource equity and student achievement in Texas since *Edgewood IV* was decided.

Problem Delineation

Although the Texas system has been in place for roughly a decade, there has yet to be a comprehensive and systematic evaluation of its effects. This study will examine the impact of reform on *fiscal neutrality* (referring to the degree to which revenue generation is dependent on property values), *revenue equity* (referring to the degree to which all students in a system are funded at similar levels), and *equity of educational outcomes* (as measured by student achievement test scores). The study will be guided by three research questions.

[2] Data is available from Texas Financial Excellence Indicator System (FEISTER), which can be accessed by contacting the Texas Education Agency.
[3] This data is available through Texas' Academic Excellence Indicator System, which is available online at www.tea.state.ts.us.

Research Questions

- How has the ability to generate revenue given equal tax effort changed since *Edgewood IV?*
- How has overall revenue equity changed since *Edgewood IV?*
- How has the relationship between student performance and property wealth changed since *Edgewood IV*?

Definition of Terms

Refined Average Daily Attendance (RADA):

A method of counting students for the purpose of providing state aid to school districts. RADA is "based on the number of days of instruction in the school year. The aggregate eligible days attendance is divided by the number of days of instruction to compute the refined average daily attendance" (the Texas Education Agency, available online at http://penick.tea.state.tx.us/staticpages/glossary.html).

Basic Allotment

This is the starting point from which state aid is calculated. It represents the minimum amount of per pupil revenue each district will receive. Several adjustments are made to this number depending on a district's particular circumstances. For example, student needs are adjusted for through the use of weighted pupils; regional variations in the cost of providing education are adjusted

for through the use of the Cost of Education Index (CEI), and adjustments are also made for economies of scale through the use of additional adjustments having to do with district size.

Cost Adjustments (The CEI)

This refers to the process of adjusting revenue or expenditure data to reflect regional variations in the cost of providing educational services. Most often, these cost differences reflect differences in the cost of recruiting and retaining qualified staff due to factors outside of the control of school districts, such as regional differences in the cost of living, differences in local crime rates, local differences in student populations, and even differences in climate that make the prospect of working in a certain location seem more or less attractive to prospective employees. The state of Texas currently uses a Cost of Education Index to adjust state aid in both Tier One and Tier Two funding allocations. This index was created through the use of regression analysis that modeled teacher salaries on a set of these uncontrollable variables.

Equity

In school finance, *equity* refers to fair or equal distribution of resources for schooling, taking into account varying student and school district characteristics. The standard used by the Texas Supreme Court is a fiscal neutrality standard, which means similar revenue for similar tax effort (Charles A. Dana Center, 2000). For the purposes of this study, equity will be defined more broadly. Berne and

Stiefel (1984) explain that examinations of school finance equity must attend to both *what* ought to be distributed equally, and *to whom.* Equity will be examined from the perspectives of both taxpayers and students, and the study will include examinations of revenue as well as skills and knowledge as measured by the Texas Assessment of Academic Skills (TAAS). Additionally, this study will examine equity with respect to these variables over time.

Foundation School Program (FSP)

The Foundation School Program (FSP) is designed to provide Texas public school districts with sufficient resources to provide a basic education for each student. Funding is comprised of local property taxes and state revenues. The local share is based on a school district's property values. FSP state revenue entitlements are based primarily on property wealth and current fiscal year factors such as student attendance, the number of students in special populations and their attendance, and each school district's tax effort.[4]

Guaranteed Yield

Under Tier Two of Texas' finance system, the state guarantees a specific per-pupil yield per penny of local tax effort. The state provides state aid equal to the difference between what the districts are able to generate locally and the guaranteed yield rate set by the state.

[4] This definition is taken from the Texas Education Agency's Financial Accountability System Resource Guide, available online at http://www.tea.state.tx.us/school.finance/audit/resguide10/far/far-70.html.

Total Tax Rate

The total tax rate is the sum of districts' interest and sinking (I & S) tax rate—which is also referred to as Debt Service and includes the interest and principal on bonds and other debt secured by property tax revenues—and their maintenance and operations (M & O) tax rate—which includes revenue generated to cover such things as salaries, utilities, and day-to-day operations.[5] Texas reports property tax rates at dollars per $100 dollars of assessed property value.

The Weighted Pupil System

Like other states, Texas allocates state aid based on a weighted number of students, rather than the actual number. The relative weights are designed to reflect differences in educational cost that have to do with differing educational needs of students. Students served by the regular program have a weight of 1.00. Career and technology students are weighted at 1.37 per FTE enrollment, and weights for special education students range from 1.7 to 5.0 per FTE. These weights are used to calculate a district's Weighted Average Daily Attendance (WADA), and this figure, in conjunction with Average Daily Attendance (ADA) is used in the determination of state aid. Specific information on how weights are calculated can be found in the appendix of this report.

[5] This definition comes from the Texas Education Agency, and is available online at http://penick.tea.state .tx.us /staticpages/glossary .html).

Texas Assessment of Academic Skills

The Texas Assessment of Academic Skills (TAAS) is the standardized assessment currently used by the state of Texas to assess the progress of students, schools, and school districts. It is a criterion-referenced assessment that is currently administered in grades 3, 4, 5, 6, 7, 8, and 10. It is based on the State Board of Education-adopted learning standards for Texas.

Implications of the Study

This work should contribute to the understanding of the degree to which policy changes after *Edgewood IV* brought about more equal access to resources and the degree to which resource equalization has reduced the performance gap between wealthy and non-wealthy school districts. In Texas, this work has significant implications for policy-makers who recently found themselves back in court over the school finance system. This time, it has been property wealthy districts arguing the system is unconstitutional. They maintain the state has established a statewide property tax, which is prohibited under the Texas State Constitution. Although this case has not yet been successful in overturning the school finance system, it has increased interest in school finance at the state level, and the legislature may consider this issue during the 78th legislative session in 2002. As the legislature reexamines school finance policy, deeper understandings of the impact of prior reform efforts will strengthen its ability to make informed

choices. Additionally, other states are still embroiled in school finance reform litigation. This study can inform decisions that policy makers will have to make in response to such litigation.

Organization of the Study

Chapter one provides a brief description of the study, including definitions of terms, and the research questions. Chapter two includes a description of school finance litigation at the national level, a brief history of school finance changes in Texas, a brief review of the literature that attempts to relate educational expenditures to educational outcomes, and a review of the current literature regarding school finance equity. The methods and data sources that are to be used in this study are laid out in chapter three. Chapter four presents results for each of the three research questions. Chapter five provides a discussion of the studies findings, and includes implications for research and policy.

CHAPTER 2

A REVIEW OF THE LITERATURE

This chapter provides a description of school finance litigation that has taken place nationwide, demonstrating that such litigation has resulted in significant changes in the way schools are funded over the past three decades. It then provides a brief history of school finance policy in Texas, describing the current finance system, and briefly discussing some of the policy issues that the legislature currently faces, demonstrating the need to carefully examine the impact of reform efforts before embarking on new policy changes. It also addresses the existing research regarding the relationship between educational spending and student achievement, which has left the question of how educational inputs relate to educational outcomes somewhat unresolved. Finally, the current literature regarding the distribution of educational resources and the distribution of educational achievement is discussed, demonstrating that the United States public school system provides unequal access to educational resources, both with respect to inputs and outcomes.

School Finance Litigation

Early school finance litigation centered around the equal protection clause of the fourteenth amendment to the United States Constitution which states: “No state shall make or enforce any law which shall abridge the privileges or

immunities of citizens of the United States." This amendment had been used to outlaw school segregation in *Brown v. Board of Education*, to eliminate charging court fees to criminals in *Griffen v. Illinois*, and to prohibit poll taxes in *Harper v. Virginia Board of Elections* (Sonstelie, Brunner, & Andon, 2000).

In the two earliest challenges to school funding systems, *Serrano v. Priest* and *Rodriguez v. San Antonio ISD*, litigants argued that dramatically unequal per pupil expenditures violated this amendment. The *Serrano* case was filed in California state court, and in 1971 the California Supreme Court held that the state's system of funding schools through property taxes did violate the equal protection clause. However, the *Rodriguez* case was filed in federal court, and in 1973, the United States Supreme Court ruled that unlike voting, education was not guaranteed under the federal constitution, so each individual state would have to rule on the constitutionality of state finance systems based on the specific language in state constitutions. After *Rodriguez*, a second wave of litigation began in state courts around the country. In this wave, litigants argued that school finance systems violated either state education clauses and/or state equal protection clauses (Levine, 1991).

Litigation Using State Equal Protection Clauses

Those cases that used equal protection clauses as their primary argument have been relatively unsuccessful compared with those that focused on state education clauses (Levine, 1991; McUsic 1991). McUsic (1991) argues that these

cases have been less successful in part because most states have adopted language for equal protection clauses very similar to that found in the federal constitution. As a result, state supreme courts are likely to interpret this language in the same way the U.S. Supreme Court did in *Rodriguez*. McUsic also notes that in order for states to invalidate school finance systems on the basis of equal protection clauses, they must either declare education to be a fundamental right, or wealth a suspect classification requiring special protection under the law. These determinations could then impact the constitutionality of the way other services are funded such as fire protection, public heath facilities and public utilities. Many state supreme courts have been reluctant to open the door to these kinds of challenges. Despite these legal issues, several states, including Arkansas, Wyoming, West Virginia and Connecticut have overturned their education finance systems on the basis of equal protection clauses, choosing to interpret those clauses differently than did the United States Supreme Court.

Litigation Using State Education Clauses

In 1984, Edgewood Independent School district filed suit in Texas, arguing that the state's finance system violated the education clause of the Texas State Constitution, which calls for a "uniform and efficient" system of public education. Since this suit, 31 others have been filed using similar arguments based on language in their state constitutions (Long, 1999). Suites that use state education clauses generally fall into two categories; those that argue for the provision of

more equitable finance systems, and those that argue for the provision of some minimum or adequate standard of education.

Unlike the U.S. Constitution, which does not specifically address the issue of education, all fifty state constitutions contain education clauses, and these clauses differ in the extent to which they contain language that relates to the provision of equitable school finance systems. McUsic (1991) analyzes the language in state constitutions according to the strength of their equity language. She notes, for example, that Montana, Louisiana, New Mexico, and North Carolina all specifically address equity, whereas states such as Texas use language alluding to the concept of equity, without specifically calling for it.[6] Other states, such as Alaska, Maine, Georgia, and Iowa have state constitutions that contain no equity language at all.

Movement Toward Adequacy

The adequacy argument has been used more recently in school finance litigation to argue for a minimum standard of education in all districts. In 1997 and 1998, courts in Ohio, New Jersey, Vermont and New Hampshire ruled against their state's school finance system on adequacy grounds (National Conference of State Legislatures, 1998).

The adequacy argument has several advantages over the equity claims that had been used in the past. First, the cost of education can vary widely depending

[6] Florida, Kentucky, North Carolina, Wisconsin, Washington, California, Arizona and Texas all use the term uniform, although courts have interpreted the meaning of this term differently.

on the local context in which education is being delivered. The source of this variation in cost is due both to differences in the price of educational inputs and to differences in the amounts of inputs required to reach a given outcome. For example, districts located in areas containing a high concentration of other districts will likely have to pay a higher teacher wage in order to compete with these surrounding districts (see Chambers, 1999), resulting in higher priced educational inputs. Some other districts may serve large populations of students with special needs and so may require smaller class sizes or additional resources in order to attain the same level of educational output as districts serving smaller percentages of students with special needs. Simply funding all districts at an equal level may ignore large differences in cost, to the detriment of some students.

The adequacy movement has gained momentum in parallel with the accountability movement, some form of which has been adopted in essentially all fifty states, because the accountability movement provides a clearer definition of adequacy than had been available previously (Keller, 2001). Michael Heiss (1995) also notes that these standards will serve as a catalyst for the next round of finance litigation because as states begin to require minimum educational outputs, districts may argue that funding increases are necessary to reach those outputs. McUsic (1991) argues that courts may be more favorable to adequacy claims than to equity claims because they leave some room for local entities to augment an adequate

education by choosing to fund their schools at a higher level than that which was determined adequate through the legislative process.

However, there is still significant debate as to how states ought to determine adequate spending levels. First, states must define adequate educational outcomes, and then must determine what level of spending is necessary to achieve those outcomes. Guthrie and Rothstein (1999) identify three methods for determining an adequate level of funding for school districts. The first is a statistical approach that infers adequate spending based on a regression model of spending on some outcome measure, holding constant any factors that may impact the cost of education. Of course, this method assumes a statistical relationship between spending and achievement, the existence of which is still being debated and which will be discussed in a later section of this report. This approach, however, may be advantageous because it effectively highlights significant differences in cost.

The second approach may be more appealing because it is conceptually simpler. Guthrie and Rothstein refer to this approach as inference from outcomes by empirical observation. In this approach districts that are achieving at adequate outcomes are identified and an adequate level of spending is one that matches spending in these districts. This approach has been used in the calculation of foundation spending levels in Ohio and Illinois and was adopted by the legislature in Mississippi (for an example of this approach, see Augenblick, 1997).

Guthrie and Rothstein refer to the third approach as the professional expert strategy. Here, policy makers rely on educational experts to identify those resources that are deemed necessary to the provision of an adequate education. These resources are then priced to determine adequate spending levels. Examples of these resources include appropriate teacher salaries, class sizes, and facilities. Chambers and Parish (1994) have used this approach in Alaska, referring to it as a Resource Cost Model.

Despite the difficulties inherent in the calculation of adequate spending levels, this approach has recently gained momentum. McUsic (1991) divides state constitutions into four categories based on the degree to which they contain language calling for the establishment of standards-based finance systems. Her first category consists of those specifying explicit and significant standards, and includes Illinois, Montana, Virginia, Louisiana, and Washington. These constitutions call for things like "the educational development of all persons to their full capabilities." Her second category includes constitutions that set less explicit standards, and she includes Texas in this category. Language in these constitutions may call for the "proper" instruction of citizens, or as in the case of Texas may call for an "efficient" system of public education designed to provide for the "general diffusion of knowledge." The third and fourth categories contain language that set lower standards. The third category includes constitutions with language referring either to encouraging, promoting, or cherishing specific

educational goals, rather than requiring them. States falling into this category include Georgia and Florida because the standards set by these constitutions are low. The final category contains constitutions with language that merely requires the establishment of educational systems, but that make no reference to the quality of these systems. Many believe that adequacy lawsuits are likely to represent the bulk of future school finance litigation, and in both Kentucky and West Virginia, state courts have ruled that their constitutions require the establishment of an adequate standard of education. Maryland has recently moved toward an adequacy-based school finance system as well, though without a mandate from the courts. In order to achieve real gains in educational opportunity and equity, systems addressing both adequacy and equity will probably be required.

The Impact of Finance Litigation Nationwide

Since 1971, a total of 31states have seen their finance systems challenged in court, often multiple times. In seventeen of these states, courts have ruled that state finance systems were unconstitutional and directed the legislature to modify the system, and currently twelve states are embroiled in school finance litigation (see Long, 1999). Given the high degree of litigation and the subsequent policy changes associated with it, policy makers must now assess the impact of changes to school finance structures both with respect to equity and adequacy. Since the Texas system has been relatively stable since 1994, this state provides an excellent context in which to examine the impact of litigation and legislation on both

students and taxpayers. Through an examination of the Texas system we can ascertain the degree to which Texas districts are able to generate revenue on a more equitable basis, students are funded at substantially equal levels, and student performance in property poor districts has improved over time.

Litigation and Reform in Texas

Mark Yudof (1991), former dean of The University of Texas Law School noted that "for more than fifty years, Texas has been in a more or less constant process of reforming its finance system for public education." He also said that each reform effort has been characterized by increased state expenditures on education and is followed by a period of relative complacency, during which time inflation, expanding enrollments, new state and federal mandates, and increased expenditures on the part of wealthy districts has lead to increased disparities in revenue and expenditures. The next section of this report examines these incremental reforms and the pressures that led property poor school districts to seek redress through the courts.

Incremental Reform: 1845-1971

The Texas constitution, adopted in 1845 when Texas became a state, charged the legislature with establishing free schools throughout the state. Used as justification for the Texas revolution from Mexico, the provision of adequate

schools has been the subject of controversy throughout Texas' history (TASBO, 2000).

State and local taxation for the purposes of public schools was not passed until 1883, and the legislature continued to move in the direction of more equitable financing of public schools when it passed rural school aid in 1915. However, in 1920 property tax limits were abolished and so even wider variation in spending was allowed to take place, now due to both differences in local communities' willingness to tax and to differing abilities to generate revenue based on property wealth (Hobby & Walker, 1994).

The Texas system remained fairly stable until the adoption in 1949 of the Gilmer-Aikin Act, which established the minimum foundation program, based on the idea that each student was entitled to a basic level of education, for which the state would pay eighty percent. In this early version of an adequacy policy, local districts were still able to subsidize this minimum program, and so wide differences in spending continued to develop (Walker & Casey, 1996).

Reform through the Courts: 1971-1994

Despite incremental efforts at reform during the years leading up to the 1971 *Rodriguez* decision in federal district court that declared the Texas system unconstitutional, inflation, expanding enrollments, new state and federal mandates, and growing expenditures on the part of property wealthy school districts resulted in increasingly unequal per pupil expenditures (Yudof, 1991). Although the

Rodriguez decision was later reversed by the United States Supreme Court in 1973, the case served as a catalyst for school finance reform (Hobby & Walker, 1991).

The 1975 legislative session saw the addition of a second tier of state equalization aid, and the level of aid given to schools was increased in both the 1977 and 1979 legislative sessions. The next serious reform legislation came in July of 1984, two months after *Edgewood Independent School District v. Bynum* was filed in state court. At this time, the legislature enacted House Bill 72, which arose both out of the *Edgewood* suit and the Perot commission report. Verstegen (1987) explains that House Bill 72 significantly changed the way that schools in Texas were financed in several ways, replacing the personnel unit program and related formulas with a weighted pupil foundation program and committing $2.8 billion to education over the next three years.

Although HB 72 made significant efforts at improving equity across Texas school districts, inequity still existed and was made worse by the 0.65 percent reduction in the education budget that occurred in 1987 (Walker & Casey, 1996). The Texas Supreme Court ruled in *Edgewood I* that the state's education finance system was unconstitutional, setting the stage for the next round of reforms.

The Edgewood Decisions

Edgewood v. Kirby originally went to trial in district court in January 1987 in the Travis County District Courtroom of Judge Harley Clark. The plaintiffs

argued that the finance system was unconstitutional under two constitutional provisions: one that maintained the system was unconstitutional based on an equal protection argument and the other based on efficiency language in the education clause of the State Constitution (Farr & Trachtenberg, 1999). Judge Clark declared that the system was unconstitutional on both grounds, but the decision was appealed and overturned by the appellate court. The case was appealed to the state Supreme Court and ruled on in October of 1989. The Supreme Court unanimously agreed that the state's school finance system violated the efficiency requirement of Article VII, Section 1 of the Texas Constitution (see *Edgewood I*, 777 S.W. 2d at 397). They further held that school districts must have "substantially equal access to similar revenues per pupil at similar levels of tax effort." In response, the legislature enacted Senate Bill One in 1990. Since the state court had mandated only substantial, rather than perfect equity, the legislature in Senate Bill One established a policy in which 95 percent of the state's pupils would be within a wealth-neutral finance system by 1995.

By this time, the state had established a two-tier system of school finance. Tier One represented the basic allotment which the state had determined must be guaranteed to every student. Tier Two represented a guaranteed yield program within which the state would contribute funds so that all districts would be able to generate revenue equal to that which could be generated by districts at the 95th percentile of wealth. This legislation also specified that only specific kinds of

revenue qualified for equalization. The legislature defined these "qualified funds," as limited to the cost per student of "exemplary programs" which would be defined by education cost studies that were to be conducted at a later date.

Soon after the enactment of Senate Bill One, *Edgewood* was retried in the district courtroom of Judge McCown. In September of 1990, Judge McCown ruled that the post Senate Bill One school finance system remained unconstitutional (see *Edgewood II*, 804 S.W. 2d at 491). The court identified several flaws in the changes made to the system as a result of Senate Bill One. First, the court held that it was unconstitutional to exclude the very wealthiest districts from equalization, noting that these districts may contain only five percent of the state's children, but they hold 15 percent of the state's total taxable property wealth. Second, it held that Senate Bill One did not make adequate provisions for ensuring long-term equity. The court also held that Senate Bill One's exclusion of certain kinds of revenue from equalization, such as revenues spent on extra-curricular activities, was unconstitutional and that some remaining un-equalized tax yield was unconstitutional, noting that any un-equalized revenue must derive only from differences in tax effort and differences in educational costs, not in differing abilities to generate revenue. Finally, the district court held that the legislature's provisions for facilities equalization were inadequate.

Despite ruling in favor of the plaintiffs with respect to the constitutionality of Senate Bill One, the district court failed to grant plaintiffs an injunction against

the distribution of state aid. The plaintiffs appealed the district court decision, asking for an injunction against the distribution of state aid and for the establishment of an earlier deadline within which the state would have to make reforms. On appeal, the state Supreme Court also held that the system remained unconstitutional because it still relied too heavily on property taxes, still allowed the existence of some low taxing, high spending school districts, and did not sufficiently restructure the system. The Supreme Court also granted the plaintiffs an injunction against the distribution of state aid, but delayed the effective date (Walker & Casey, 1996).

The legislature responded by passing tax base consolidation in Senate Bill 351 and House Bill 2885. This legislation created 188 county education districts (CEDs) that would levy taxes each year to collect the local share of the foundation school program. The CEDs were created in such a way that none had an excess of $280,000 per weighted ADA. This legislation also established revenue and tax rate limits on school districts. Clark (1995) noted that this approach has the advantage of improving equity by redistributing property wealth, but may have the disadvantage of not attending to whether schools are funded adequately.

Although the district court upheld the state's right to establish CEDs, the state supreme court ruled that the CED tax was unconstitutional because school taxes were levied without local voter approval as required by Article VII, Section

3, and the tax constituted a state property tax, which is specifically prohibited by Article III, Section 1e (see *Edgewood III*, 826 S.W. 2d at 489).

Finally, after proposing several constitutional amendments to Texas voters, all of which failed, the legislature passed Senate Bill 7, which required that school districts with property value in excess of $280,000 per weighted student would have to engage in some form of tax base reduction. These districts could choose between five different options for reducing their tax bases. They could (1) voluntarily consolidate with another district, (2) detach some of their tax base, (3) purchase attendance credits from the state, (4) contract for the education of non-resident students, or (5) consolidate their tax base with another district (the last three of these options require voter approval). Although this legislation was challenged by property poor school districts in *Edgewood IV,* both the district court and the Supreme Court upheld the constitutionality of the post SB 7 school finance system.

The Current System

Since SB 7, continued incremental changes have taken place. In 1995, Senate Bill One increased the basic allotment, added a mid-sized schools adjustment, a modest school facilities grant program, and an increase in the guaranteed yield among other things. In 2001, several property wealthy districts have challenged the constitutionality of the Texas system. Specifically, they assert

that the $1.50 tax ceiling[7] results in a state wide ad valorem tax, which is in violation of article VII section 1 of the Texas Constitution. They cite the Supreme Court ruling in *Edgewood IV* which said,

> if the cost of providing for the general diffusion of knowledge continues to rise, as it surely will, the minimum rate at which districts must tax will also rise. Eventually, some districts may be forced to tax at the maximum allowable rate just to provide a general diffusion of knowledge. If a cap on tax rates were to become in effect a floor as well as a ceiling, the conclusion that the state had set a statewide ad valorem tax would appear to be unavoidable because the districts would then have lost all meaningful discretion in setting the tax rate.

Edgewood IV, 893 S.W.2d at 450.

The district court has ruled that the current cap of $1.50 does not yet represent a statewide property tax because there are not a sufficient number of districts forced to tax at the $1.50 ceiling in order to provide an accredited education. The court notes that, although 19 percent of Texas' school districts currently tax at this limit, only 12 percent of Texas' school districts do so without having granted local property exemptions, which in

[7] Te imposes a $1.50 limit on the tax rate that districts can set for maintenance and operations. Roughly 40 percent of Texas students are projected attend a district that is taxing at this rate during the 2002-03 school year according to property tax rates released by the comptroller.

effect lower the property tax rate by removing value from the system. Furthermore, the court notes that the plaintiffs present no evidence that these districts are forced to tax at this rate in order to provide an accredited education.

Although the legislature does not currently find itself faced with a court order to once again revisit the way Texas schools are financed, there is a general consensus that school finance ought to be examined, especially in light of the recent court challenge. As law makers think about how to amend the current system, it is important that they examine the impact of prior reforms, taking time to think about how these reforms impacted both revenue equity and student achievement.

The Relationship Between Spending and Achievement

As lawmakers begin talking about how to address school finance in the 78th Legislative session, the idea of ensuring adequacy will likely be an important part of the discussion. As noted earlier in this report, in order for researchers to confidently estimate the cost of providing specific educational outcomes, the relationship between spending and student academic performance must be well understood. Some researchers have pointed to the fact that educational spending has increased dramatically since the 1960s and educational achievement, as measured by SAT scores and standardized achievement test scores such as the National Assessment of Educational Progress (NAEP), have remained relatively

flat during that same time period as evidence of the ineffectiveness of educational resources (see Hanushek, 2000). Others, have noted that the increases in educational spending are exaggerated as a result of inappropriate adjustments for inflation and because a significant proportion of the increases that have occurred have gone to support rapidly growing special education programs (Grissmer, et. al, 2000, Berliner & Biddle, 1995). These authors note that special education expenditures will not impact standardized achievement test scores because special education students are often excluded from such tests. They also note that the use of SAT data for assessing school effectiveness is inappropriate because of the significant amount of selection bias that is associated with that test. Specifically, they maintain that the drop in aggregate SAT scores is most likely due to the fact significantly more students are now taking the SAT.

Researchers have also relied on the use of production functions to try to unravel this relationship. The use of production functions in education takes root in the Coleman report of 1966 that was mandated by the Civil Rights Act of 1964. In this report, researchers used survey and achievement test data from more than 3,000 schools, and the report was the most complete description of elementary and secondary schools ever produced. One of the most startling and controversial statements to come out of that report was that "family and peer group characteristics are more instrumental in promoting student achievement than school characteristics" (Coleman, et.al., 1966). The publication of this report

began a debate about the effectiveness of additional school resources that is still not resolved.

These studies have not produced consistent results, but instead have shown wide variation in terms of the impact of school spending on student achievement, leaving policy makers with no widely agreed upon strategy for spending education dollars in such a way as to efficiently increase student performance. In analyzing 130 production function studies, Hanushek (1981) reported that "the inputs on which schools tend to concentrate, and which lead to differences in expenditures, appear to have no consistent payoff in terms of higher student performance." However, others have contested this conclusion. However, Hedges, Lane, & Greenwald (1994) reanalyzed the same 130 studies as Hanushek and came to a conclusion that was markedly different from Hanushek's. They maintained that their reanalysis clearly showed "systematic positive relationships between educational resource inputs and educational outcomes." They criticized Hanushek's approach on a number of different levels. Their first criticism was that Hanushek's method of vote counting is inconsistent with the null hypothesis of no effect in every study. They concluded that if per pupil expenditures and outcomes were truly unrelated then we would expect 50 percent of the studies to show positive relationships and 50 percent to show negative ones. We would also expect that only 5 percent of the studies would demonstrate statistically significant results. However, 70 percent of the studies used by Hanushek showed a positive

relationship between per pupil expenditures and student outcomes, and between 12 and 35 percent of the studies showed statistically significant results.

Since these meta-analyses, others have found positive and statistically significant relationships between additional expenditures and student performance. Elizabeth Harter (1999) analyzed school level data in Texas and found that expenditures, especially those for supplements to teacher salaries and supplies and materials, are associated with higher levels of student performance. Most recently, Grissmer, and his colleagues (2000) used state level data to explore the relationship between expenditures and outcomes on the NAEP, and concluded that "the level of per pupil expenditures and how they are targeted can make significant differences in student achievement."

Economists and educators have also debated the appropriateness of applying production function techniques to education. Spencer and Wiley (1981) argue that production functions do not translate well to the field of education because, while in the business world there is typically the one generally agreed upon goal of profit maximization, there are multiple and diverse goals for schools that are determined through the political process, and these cannot be easily summed up in a single test score. Additionally, they argue that while econometric models assume that the most efficient combination of inputs is generally known, this is not the case in education. In fact, they maintain that production functions in the educational context lack a sufficient theoretical framework. One improvement

to these models came with the addition of variables designed to reflect differences in educational costs.

The Relationship between School Characteristics and the Cost of Education

Monk and Rice (1999) note that considerations of educational production functions must also take into account the relationship between productivity and cost. A number of different studies have attempted to quantify the degree to which similar educational services require different expenditures in different contexts. Chambers (1995) notes that because personnel expenditures account for roughly 80 percent of overall district budgets, it is especially important to adjust for differences in salaries necessary to attract and retain teachers. Hedonic wage models have been used to create salary indices based on factors that may impact the cost of attracting teachers. These models use regression analysis to model wages on school characteristics such as regional variations in the cost of living, salaries offered by neighboring school districts, the distance from certificating institutions, local crime rates, and climactic differences (Chambers, 1995). Some states, including Texas, use these indices in their state finding systems. Equity analyses should also take into account differences in educational cost and educational need, and most analysts now agree that there can be valid reasons for differential educational expenditures based on these differences. Additionally, these differences probably account for some of the differences in performance that may persist, even after resource equity has been achieved.

Unequal Access to Schooling

A significant body of work documents the fact that American school children do not receive the same levels of educational opportunity. The causes of this inequity are not as clear. Some argue that the public school system has failed poor and minority children due to lack of resources and others argue that inefficiencies in the educational system are to blame. A third argument suggests that the economic and social disadvantages that many children face are so severe for that the school system cannot fully compensate.

There has long been evidence of discrepancies in educational resources among America's public schools. Coleman (1966) was one of the first to document the significant levels of resource discrepancies that existed in America's public schools. In particular, he noted that on average, white children attended schools with lower teacher student ratios, had access to a greater range of extra curricular activities, and attended schools with more advanced level courses.

Since then, others have documented continuing disparities in educational resources, and these discrepancies have been found at the national level between states (U.S. Department of Education, National Center for Education Statistics, 1998), at the state level between districts (Hartman, 1994), and at the district level, between schools (Owens & Maiden, 1999). Recently, the National Center for Educational Statistics (1998, p. 9) reported that the lowest poverty and lowest

percent minority districts have "substantially more actual general education revenues than their higher-poverty and percent minority counterparts." They further found that, although these discrepancies were somewhat mitigated by the fact that higher poverty and higher minority districts generate greater categorical revenues,[8] disparities still exist. As a result, categorical revenues such as Title I finds do not provide the supplement to high poverty districts that they are intended to, but only begin to make up for inequity in overall funding systems.

These differences in resources are accompanied by differences in educational performance. The 2000 National Assessment of Educational Progress (NAEP) mathematics data provides continuing evidence of a performance gap, and although student performance for all ethnicities improved, the gap between white students and black and Hispanic students has remained basically unchanged since 1994.

Recent Equity Studies

Although there has not yet been an analysis of the impact of post-*Edgewood* legislation, a number of researchers have looked into the impacts of school finance reform in other states. Early analyses of the impact of *Serannno* in California found that state level litigation had the unintended impact of "leveling

[8] Categorical revenues refer to those state and federal revenues that are generally designated to serve some specific purpose. Most are designed to support certain student populations such as students with disabilities, students with Limited English Proficiency, or students living in poverty.

down" educational spending (Silvia & Sonstelie, 1995). However, more recent analyses of the impact of reform in other states have shown improvements in finance equity. Evans, Murray, and Schwab (1997) examined resource allocation after litigation between1972 and 1992 and found that after successful litigation, states tended to increase their aid to property poor districts while maintaining aid to wealthy districts.

Others have looked more specifically at the impact of reform within states. Rubenstein, Doering, and Gess (2001) examined the impact of litigation on finance equity in Georgia, although they did not look into its impact on student achievement. They examined both horizontal equity, which assumes that all students in a system ought to be treated equally, and vertical equity, which assumes that some unequal spending due to unequal educational need is justified. To examine vertical equity, they divide total district expenditures by a weighted student count, rather than by total enrolments or average daily attendance. In this approach, students that require additional resources, such as special education students, are given additional weight, effectively reducing per pupil expenditures that serve large proportions of such students. Their analysis shows greater improvements in vertical equity than in horizontal equity, and they account for this difference because of the fact that state policy in Georgia specifically allows unequal expenditure that is targeted to account for these differences in educational need. Additionally, they found that equity measures in that state worsened when

faced recession and reduced its share of funding in relationship to local school districts, and improved when economic conditions improved and the state increased its share of funding. They also found that the state's equalization plan weakened the negative effect of low property values for poor districts.

Goldhaber and Callahan (2000) found that the establishment of the Basic Education Plan in Tennessee led to improvements in overall equity within the system as well as increased funding for all school districts. They also found that these improvements reversed a prior trend of falling expenditures relative to other states in the nation. They called for similar analyses in toher states whose finance systems have been overturned to see whether litigation has had similar effects elsewhere. Peevely and Ray (2001) also examined the impact of litigation in Tennessee and found that, although litigation did improve resource equity in that state, it did not result in improvements in the equity of educational outcomes. They came to this conclusion after comparing student test scores between litigant versus non-litigant school districts over time. They found that Tennessee's litigant districts did not improve at consistently higher rates than non-litigant districts. However, reform efforts in Tennessee, as in Texas, were implemented incrementally. This study may have taken place before reform efforts had sufficient time to have impacted student achievement.

Verstegen (1987) examined the impacts of reform efforts that were implemented in Texas through House Bill 72. Using many of the same equity

statistics used in this report, she examines revenue equity and fiscal neutrality in 1976, prior to reform, and again in 1986 after the implementation of HB 72. This study will serve as the basis of comparison for this study.

This study will build upon these three analyses, examining the impact of reform in Texas on resource equity and student achievement. The methodology used in this study will be similar to that of both Peevely and Ray in terms of student achievement and Rubenstein, Doering and Guess in terms of vertical and horizontal resource equity. The methodology will be spelled out in greater detail in the next chapter.

CHAPTER 3:

METHODOLOGY

This chapter restates the research questions, provides a description of the data and data sources, presents an analytic framework for the study, and describes the methods used to answer the three research questions.

Research Questions

- Fiscal Neutrality: How has the ability to generate revenue given equal tax effort changed since *Edgewood IV?*
- Revenue Equity: How has overall revenue equity changed since *Edgewood IV?*
- Equity of Outcomes: How has the relationship between student performance and property wealth changed since *Edgewood IV*?

The Data

Data for this project comes from several sources. All financial data come from the Texas Education Agency's Financial Excellence Indicator System (FEISTER) which is available through the Texas Education Agency. All student achievement data come from the Academic Excellence Indicator System database and are

available online through www.tea.state.tx.us. The data used to adjust for regional variations in the cost of education were provided by the Charles A. Dana Center at The University of Texas at Austin and are the result of their three-year salary and benefits model (see Charles A. Dana Center, 2000). The values for the Weighted Average Daily Attendance were provided by Moak, Casey, & Associates, and reflect the weights currently used by the state in determining state aid, but have the effects of the current CEI removed. For all analyses, districts with no property wealth, districts that had a refined average daily attendance of less than 30, and charter districts were eliminated.

Analytic Framework

Berne and Stiefel (1984) pose the following four questions around which they center their analysis of school finance equity, and these questions will be used as a framework for this study.

1. What is the makeup of the groups for which school finance systems should be equitable?

This project will focus on both taxpayers and students. The Texas court has specifically addressed this question, calling on the legislature to establish a system that enables taxpayers to generate substantially equal revenues given equal levels of tax effort. They go on to say that some unequal expenditures are constitutionally acceptable, as long as these arise only from unequal levels of tax

effort and not a differing ability to generate revenue. However, Berne and Stiefel also point out that a concern for the quality of children's experiences in the present justifies the importance of examining equity from the student perspective, given that students spend so much of their day in school. The first of the three research questions for this project will address equity from the taxpayer perspective, and the other two take up this issue from the perspective of students.

2. What services, resources, or more generally, objects should be distributed fairly among members of the groups?

With respect to *what* educational resources must be distributed equitably, a number of possibilities come to mind. Most commonly, researchers examine inputs in terms of educational dollars. However, it is important to distinguish which educational dollars will be examined. This study will focus only on state and local revenue because these are impacted by post –*Edgewood* reforms. Federal revenue, such as those provided through Title I, will be excluded. In addition to examining educational dollars, I also address equity with respect to student outputs, although for the purpose of this study educational outputs will be defined very narrowly. Clearly, the broad construct of educational outputs is larger than any one measure or set of measures, as we expect schools to accomplish a large number of things, only a small subset of which we have attempted to quantify over time. For this analysis, I examine student performance on the Texas Assessment of Academic Skills (TAAS), but the fact that this

analysis is limited to this measure should not be taken as an endorsement of the notion that this test accurately measures all of the outputs for which schools are responsible.

3. What principles should be used to determine whether a particular distribution is equitable?

This study explores both horizontal and vertical analyses of equity, and uses methods similar to Rubenstein, Doering, and Gess (2000) to adjust for differences in educational need in the vertical analyses. I will address the methods for doing this more fully in a later section of this chapter.

4. What quantitative measures should be used to assess equity?

The specific measures used to address each question will be outlined in the sections below, but it is also important to note that within each of the three research questions, this study examines both whether the system has reached particular levels of equity and how or if equity measures change over time. The specific analytic techniques used to address the research questions are outlined according to each of the three research questions.

Fiscal Neutrality

How have taxpayers' abilities to generate revenue given equal tax rates changed since Edgewood IV?

Two approaches were used to answer this question: a regression analysis of per pupil revenue on per pupil property wealth and tax rates, and an examination of yield per penny of tax effort. All analyses include revenue that has been adjusted for cost differences and that has been computed per pupil and per weighted pupil. Cost adjustments were made according to the following formula:

((.71 * state and local revenue)/CEI) + .(29 * (state and local revenue))

The formula only adjusts 71 percent of state and local revenue by the CEI because the CEI is meant to account for differences in the cost of hiring professional staff, and the legislature has recognized that districts spend, on average, 71 percent of their overall budget on professional salaries. These methods are primarily a replication of work done by Rubenstein, Doering, and Gess (2000) in Kentucky, although this study will use tax rates as a control variable.

These analyses use individual students as the unit of analysis. An analysis conducted at the district level would ignore differences in district size, which in Texas are quite large. However, it is important to note that we do not actually have access to actual spending levels at the student level. Although we can create a per pupil revenue value for each district by dividing state and local revenues by enrolled pupils or even weighted pupils, a number of authors have documented inequity of expenditures within districts (see Owens & Maiden, 1999).

The logged form of the revenue variable is used and has two advantages over the non-logged form. First, because of the positive skew of this variable, the

logged form yielded regression models that produced a better fit in terms of correlations between actual and predicted values for the dependent variable. Second, the logged form has the advantage of producing results that are easier to interpret because the beta coefficients can be interpreted as percent changes. The equation for the regression analyses is as follows:

$Ln(Y) = ß_0 + ß_1X_1 + ß_2 X_2 + €$

Y represents districts revenue per pupil, X_1 represents districts' total adopted tax rates, and X_2 is districts' per pupil property wealth.

Revenue Equity

How has revenue equity changed since Edgewood IV?

I will address this question through the use of several equity statistics outlined by Odden and Picus (2000) and Bernie and Stiefel (1984). I will incorporate measures of horizontal equity, which assume that all students are alike and so should be treated similarly, and vertical equity, which recognize cost differences. The same basic measures can be used to assess these constructs, but when assessing vertical equity, adjustments will be made for cost differences and for differences in educational need. This will be done using the same cost adjustment and weighted pupil approach described above. These analyses also use individual students as the unit of analysis.

A number of univariate measures of horizontal resource equity exist.

Range: The simplest of these is an examination of the difference between the minimum and maximum per pupil revenue and expenditure values. However, these values are likely to be outliers and so may not provide an accurate picture of resource equity across a system, but only between the two most extreme values in the system.

Restricted range and federal range ratio: The restricted range is an improvement over the total range in that it examines the difference between observations close to the top and bottom of the distribution, for example at the 5^{th} and 95^{th} percentiles. Odden and Picus note that although this approach is preferable to an examination of the range, it is still only a comparison between two values in the system, and not an examination of the entire system. They further caution that the restricted range is likely to increase with inflation, even if all other aspects of the system remain stable. This issue is addressed through the use of the federal range ratio, which is calculated by dividing the restricted range by the observation at the 5^{th} percentile.

Coefficient of variation: This statistic measures the percent variation around the mean, and is calculated by dividing the standard deviation by the mean. A value of zero indicates that revenues are distributed uniformly throughout the system. Lower variation indicates greater relative equity within a system, and Bernie and Stiefel recommend a cutoff of roughly 10 percent as an acceptable level of inequity within a system.

The Gini Coefficient: The Gini coefficient is a fourth equity measure, which is taken from the field of economics where it is primarily used to measure income inequity. In this method, the cumulative percentage of revenues is compared to the cumulative percentage of students enrolled. This value is plotted and compared to a 45-degree line, which represents perfect equity. The area between the 45-degree line and the curve representing expenditures and enrollments is computed, and this value is called the Gini coefficient. As with many other equity measures, there is no universally accepted level under which we would determine a system to be equitable, but values less than 0.05 are often considered desirable (Odden & Picus, 2000).

The McLoone and Verstegen Indices: These are the final measures of horizontal equity. The McLoone Index is the ratio of the sum of all values below the mean to the sum of all values if they had the value of the mean, and so it is only a measure of equity in the bottom half of the distribution. The Verstegen Index is essentially the opposite, in that it is a measure of equity in the top half of a distribution, and it is the ratio between the sum of all values above the mean to the sum of all values if they had the value of the mean. For both of these indices, values of 1.0 represent perfect equity, and values greater than 0.95 are considered desirable (Odden & Picus, 2000). These two measures are conceptually much simpler than the Gini coefficient, and together present a good picture of the equity in a given system (Odden & Picus, 2000).

Equity of Outcomes

How has the relationship between property wealth and student performance changed since Edgewood IV?

Although Peevely and Ray (2001) address this question in Tennessee by comparing the performance of litigant versus non-litigant school districts, it may be the case that not all property poor districts who benefited from litigation participated in that litigation. Rather than sorting districts into property wealthy and property poor, this analysis examines the relationship between property wealth and student achievement test scores using a regression analysis. The percentage of students passing all sections of the TAAS will serve as the dependent variable, and property wealth serves as an independent variable. The percentage of students participating in the federal free-and-reduced price lunch program serves as a control. The regression equation for this approach is as follows:

$$Y=ß_0 + ß_1(X_1) + ß_2(X_2) + €$$

Here, Y represents the percentage of students at each grade level who passed all sections of the Texas Assessment of Academic Skills, X_1 represents the percentage of students in the district who participated in the federal free and reduced-priced lunch program, and X_2 represents districts' per-pupil property wealth.

A second set of analyses uses a dummy coded variable, coded one if districts fall into the bottom quintile of property wealth per student and zero otherwise, attempts to isolate the impact of reforms on property poor districts.

$$Y=ß_0 + ß_1(X_1) + ß_2(X_2) + €$$

Here, Y again represents the percentage of students at each grade level who passed all sections of the Texas Assessment of Academic Skills, X_1 represents the percentage of students in the district who participated in the federal free and reduced-priced lunch program, and X_2 is coded one if the district's per pupil property wealth is in the bottom quintile of all districts and zero otherwise. Separate regression analyses were run at the third through eighth grade levels.

Summary of Methods

This project will examine equity within the Texas Education system, in an effort to gain a deeper understanding of what impact post-*Edgewood* legislative reform has had on equity with respect to both educational inputs and outcomes. An analysis of the relationship between revenue and property wealth yield information regarding the degree to which post-*Edgewood* reforms have provided improvements in tax-payer equity that was mandated by the courts. Additionally, analyses of univariate horizontal and vertical equity measures provide information regarding how these changes have impacted districts' differing abilities to educational resources to students. Finally, analyses of the relationship between property wealth and student performance yields information regarding the degree

to which students' access to skills and knowledge has become less associated with the property wealth of the district in which they are educated.

CHAPTER 4:

RESULTS

This chapter presents results for the three research questions. Since the first two questions—those dealing with revenue neutrality and resource equity—are based on the same variables, descriptive statistics for these variables are presented first. Numbers provided for all variables reflect the fact that the dataset was weighted by average daily attendance for analyses involving both of the first two research questions. The final section of this chapter deals with research question three on student performance. Variables used in this analysis are measured at the district level and are not weighted. For all analyses in a given year, districts with an average daily attendance of less than 30, districts that had no taxable property value, and charter districts were eliminated.

Table 1 provides the mean and standard deviation values for per pupil state and local revenue. It indicates just over a 30 percent increase in state and local revenues over this six year time period. However, these figures are not adjusted for inflation.

Table 1. Mean and standard deviation of state and local revenue per student: 1995-2000

Year	Average Daily Attendance	Mean Revenue	Standard Deviation
1995	**3,349,470**	**$5,253.46**	**$665.84**
1996	**3,431,028**	**$5,716.78**	**$680.59**
1997	**3,510,196**	**$5,886.71**	**$742.00**
1998	**3,578,026**	**$5,474.87**	**$757.96**
1999	**3,626,948**	**$6,323.59**	**$759.18**
2000	**3,677,390**	**$6,930.41**	**$797.13**

When revenues are adjusted for regional differences in the cost of education,[9] mean values decline for all years, but reflect a similar increase over time.

Table 2. Mean and standard deviation of cost adjusted state and local revenue per student: 1995-2000

Year	Average Daily Attendance	Mean Revenue	Standard Deviation
1995	**3,349,470**	**$4,701.87**	**$636.74**
1996	**3,431,028**	**$5,116.51**	**$664.84**
1997	**3,510,196**	**$5,268.86**	**$742.00**
1998	**3,578,026**	**$5,474.87**	**$757.96**
1999	**3,626,948**	**$5,657.34**	**$746.65**
2000	**3,677,390**	**$6,197.01**	**$775.89**

When state and local revenue are adjusted for differences in the educational needs of students within districts using a weighted[10] pupil approach, the mean

[9] Cost of Education Index values come from the Charles A. Dana Center's Study of Uncontrollable Variations in the Cost of Texas Public Education, accessed online at http://www.utdanacenter.org /research/ceifall00.html. For this study, the three year salary and benefits model figures are used.

values decline further, and these data reflect just under a 30 percent increase in revenue over the six years.

Table 3. Mean and standard deviation of state and local revenue per weighted student: 1995-2000

Year	Weighted Average Daily Attendance	Mean	Standard Deviation
1995	**3,347,745**	**$4,196.83**	**$533.42**
1996	**3,429,121**	**$4,544.54**	**$515.71**
1997	**3,508,214**	**$4,658.11**	**$520.90**
1998	**3,576,018**	**$4,821.28**	**$562.10**
1999	**3,624,876**	**$4,974.07**	**$602.05**
2000	**3,675,308**	**$5,392.87**	**$551.54**

The last set of revenue data in table 4 applies both the cost adjustments and the weighted pupils.

Table 4. Mean and standard deviation of cost adjusted state and local revenue per weighted student: 1995-2000

Year	Weighted Average Daily Attendance	Mean Revenue	Standard Deviation
1995	**3,347,745**	**$3,750.87**	**$456.08**
1996	**3,429,121**	**$4,061.07**	**$440.76**
1997	**3,508,214**	**$4,162.60**	**$451.22**
1998	**3,576,018**	**$4,307.97**	**$490.72**
1999	**3,624,876**	**$4,442.73**	**$519.68**
2000	**3,675,308**	**$4,814.22**	**$551.54**

[10] The weights reflect those used by the Texas Education Agency to determine state funding, with the effects of the state Cost of Education Index removed. See the appendix of this report.

Table 5 presents total tax rate data. The mean total tax rate increased from $1.44 in 1994 to $1.54 by 2000 (again, this reflects data that is weighted at the student level).

Table 5. Mean and standard deviation of total tax rates: 1995-2000

Year	Number	Mean	Standard Deviation
1995	**3,349,470**	**$1.44**	**$.143**
1996	**3,431,028**	**$1.45**	**$.142**
1997	**3,510,196**	**$1.47**	**$.142**
1998	**3,578,026**	**$1.50**	**$.148**
1999	**3,626,948**	**$1.55**	**$.143**
2000	**3,677,390**	**$1.54**	**$.125**

Finally, table 6 presents data on taxable property wealth per student. Both the mean and standard deviations of property wealth per student have increased over this time period.

Table 6. Mean and standard deviation of property wealth per student: 1995-2000

Year	Number	Mean	Standard Deviation
1995	**3,349,470**	**$191,338.82**	**$256,827.14**
1996	**3,431,028**	**$194,781.54**	**$243,104.30**
1997	**3,510,196**	**$199,501.14**	**$241,911.47**
1998	**3,578,026**	**$200,064.18**	**$255,102.44**
1999	**3,626,948**	**$209,512.72**	**$262,059.56**
2000	**3,677,390**	**$218,833.64**	**$261,136.47**

The next sections will present results related to the three research questions.

Fiscal Neutrality

How have taxpayers' abilities to generate revenue given equal tax effort changed since Edgewood IV?

This section addresses two issues—the degree to which Texas school districts are revenue neutral, and the degree to which they are revenue neutral after accounting for differences in cost. Two sets of analyses are used to address this question; a multiple regression analysis and an examination of state and local revenue yield per penny of tax effort.

The regression approach

A multiple regression analysis provides the ability to test for statistically significant differences in revenue generation based on property wealth, holding tax rates constant. These analyses show that there is some inequity within the current system since property wealth is consistently positively associated with revenue generation at a statistically significant level. However, the practical significance of these relationships can be difficult to interpret. Additionally, this analysis does not enable us to understand where within the system inequity may exist.

For these analyses, state and local revenue per pupil serve as the dependent variable and district total tax rate and property wealth per pupil serve as independent variables. Because we are interested in the effect of property wealth holding tax rates constant, tax rates are entered into the model first.

These analyses use the logged form of state and local revenues. This approach has two advantages over a straight revenue variable: the logged form of the variable is less positively skewed and so produces a better fit, and the logged model produces results that are easier to interpret since the resulting beta coefficients reflect percentage changes in revenue. Correlations between predicted and actual sate and local revenues for both the logged and non-logged forms of the model were run and the logged form of the model produced a better fit in each year.

Table 7 presents results from these analyses. In order to facilitate interpretation, the beta coefficients for property wealth per student are presented in standard deviations of property wealth per student. The data show that a standard deviation of increased property wealth per student results in between a 3.6 and 4.8 percent difference in revenue generation each year.

Table 7. Beta coefficients for property wealth and tax rates on state and local revenue per pupil: 1995-2000

	1995 R^2**=.272** N=3,349,468	**1996** R^2**=.214** N=3,431,025	**1997** R^2**=.173** N=3,510,194	**1998** R^2**=.165** N=3,578,023	**1999** R^2**=.194** N=3,626,946	**2000** R^2**=.133** N=3,677,388
Total tax rate*	.287	.263	.204	.174	.185	.170
Wealth/ student*	.0477	.0372	.0383	.0403	.0428	.0356

*All beta values were statistically significant at the p<.001 level.

Table 8 shows that adjusting for regional variations in the cost of education reduce the effect size slightly most years, but slightly increase it in 2000. Again, the wealth per student coefficients are presented in standard deviation units.

Table 8. Beta coefficients for property wealth and tax rates on cost adjusted state and local revenue per pupil: 1995-2000

	1995 R^2**=.189** **N=3,349,468**	**1996** R^2**=.128** **N=3,431,025**	**1997** R^2**=.103** **N=3,510,194**	**1998** R^2**=.100** **N=3,578,023**	**1999** R^2**=.125** **N=3,626,946**	**2000** R^2**=.189** **N=3,677,388**
Total tax rate*	.204	.182	.122	.086	.105	.009
Wealth / student*	.0450	.0341	.0348	.0366	.0388	.0640

*All beta values were statistically significant at the p<.001 level.

When revenue is adjusted for weighted pupils, the effects of property wealth increase more substantially, a standard deviation increase in property wealth results in a 6.3 percent increase in revenue in 1996 and a 10.5 percent increase in 1999.

Table 9. Beta coefficients for property wealth and tax rates on state and local revenue per weighted pupil: 1995-2000

	1995 R^2**=.557** N=3,347,742	**1996** R^2**=.574** N=3,429,117	**1997** R^2**=574** N=3,508,211	**1998** R^2**=.580** N=3,576,016	**1999** R^2**=.480** N=3,624,874	**2000** R^2**=.668** N=3,675,306
Total tax rate	.545	.531	.475	.460	.372	.586
Wealth / student*	.0746	.0633	.0747	.0868	.1054	.0990

*All beta values were statistically significant at the p<.001 level.

Finally, table 10 shows the effects of applying both cost adjustments and weights. Here, effects range from 5.9 percent in 1996 to almost 10 percent in 1999.

Table 10. Beta coefficients for property wealth and tax rates on cost adjusted state and local revenue per weighted pupil: 1995-2000

	1995 R^2**=.499** N=3,347,742	**1996** R^2**=.503** N=3,429,117	**1997** R^2**=.489** N=3,508,211	**1998** R^2**=.480** N=3,576,016	**1999** R^2**=.573** N=3,624,874	**2000** R^2**=.619** N=3,675,306
Total tax rate	.462	.450	.394	.372	.421	.490
Wealth / student*	.0722	.0599	.0705	.0824	.0997	.0935

*All beta values were statistically significant at the p<.001 level.

Yield per penny of tax effort

Policy-makers and the general public more commonly talk about revenue generation per penny of tax effort, and these data are presented below. These analyses demonstrate that, overall, the system is relatively equitable except for those districts within the top quintile of property wealth. These districts are consistently able to generate more revenue per penny of tax effort than other

districts in the state, regardless of year or cost adjustment. For example, figure 1 indicates that in 2000, districts in the highest quintile of property wealth were able to generate almost $56 in revenue per penny of tax effort while districts in the lowest quintile generated just over $46 per penny of tax effort.

Figure 1. Yield per penny of tax effort: 1995-2000

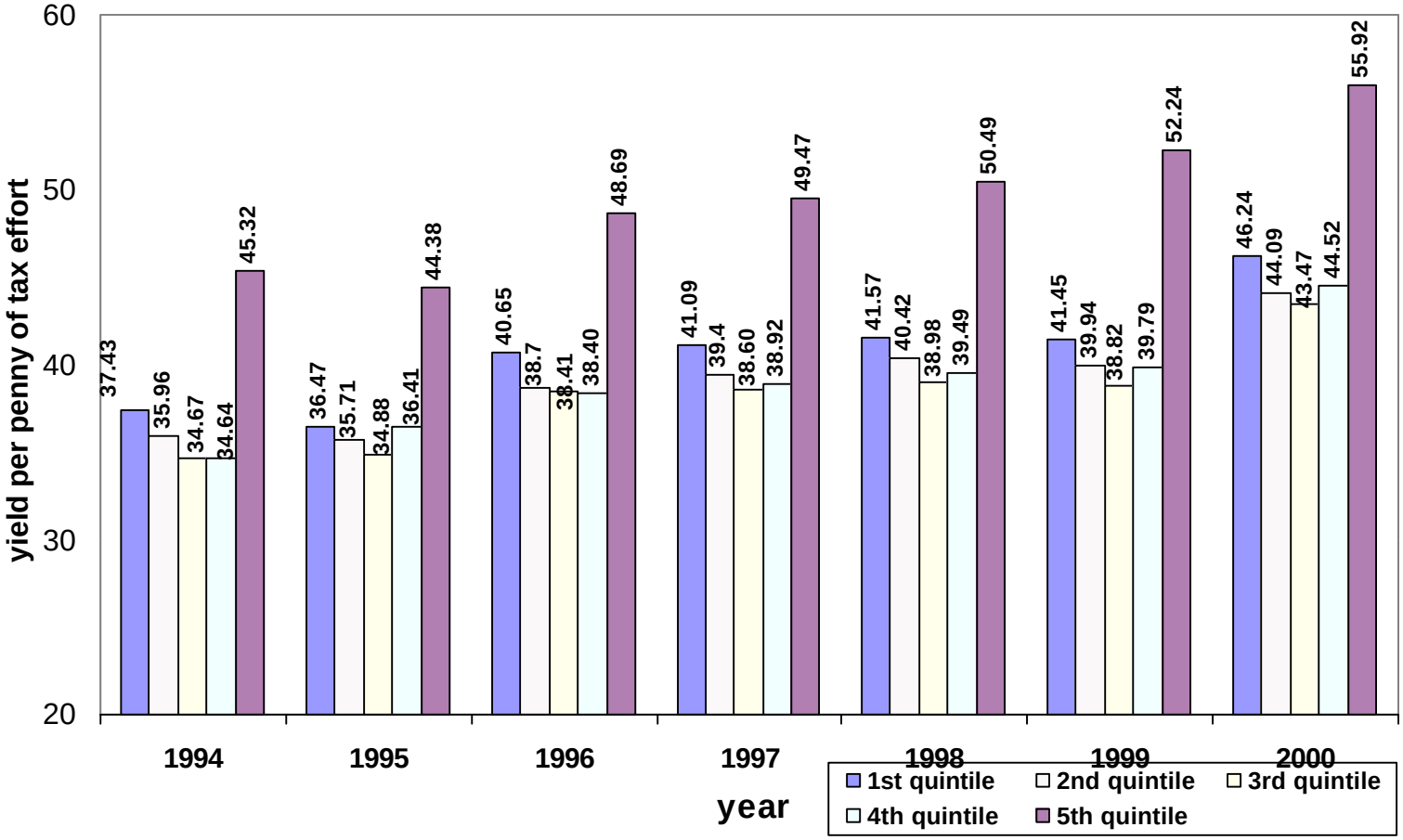


Figure 2. Cost adjusted yield per penny of tax effort: 1994-2000

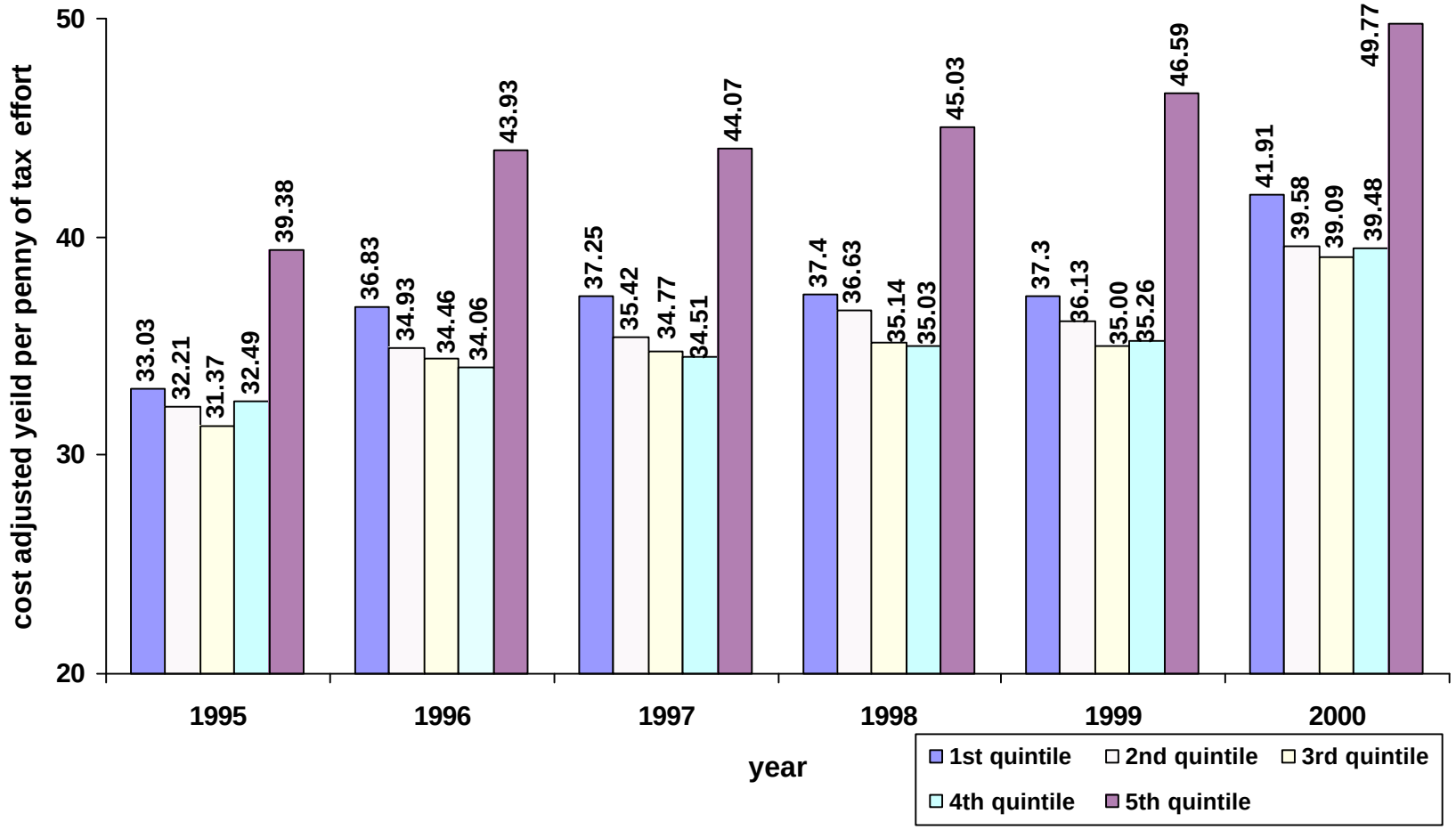


Figure 3. Weighted yield per penny of tax effort: 1994-2000

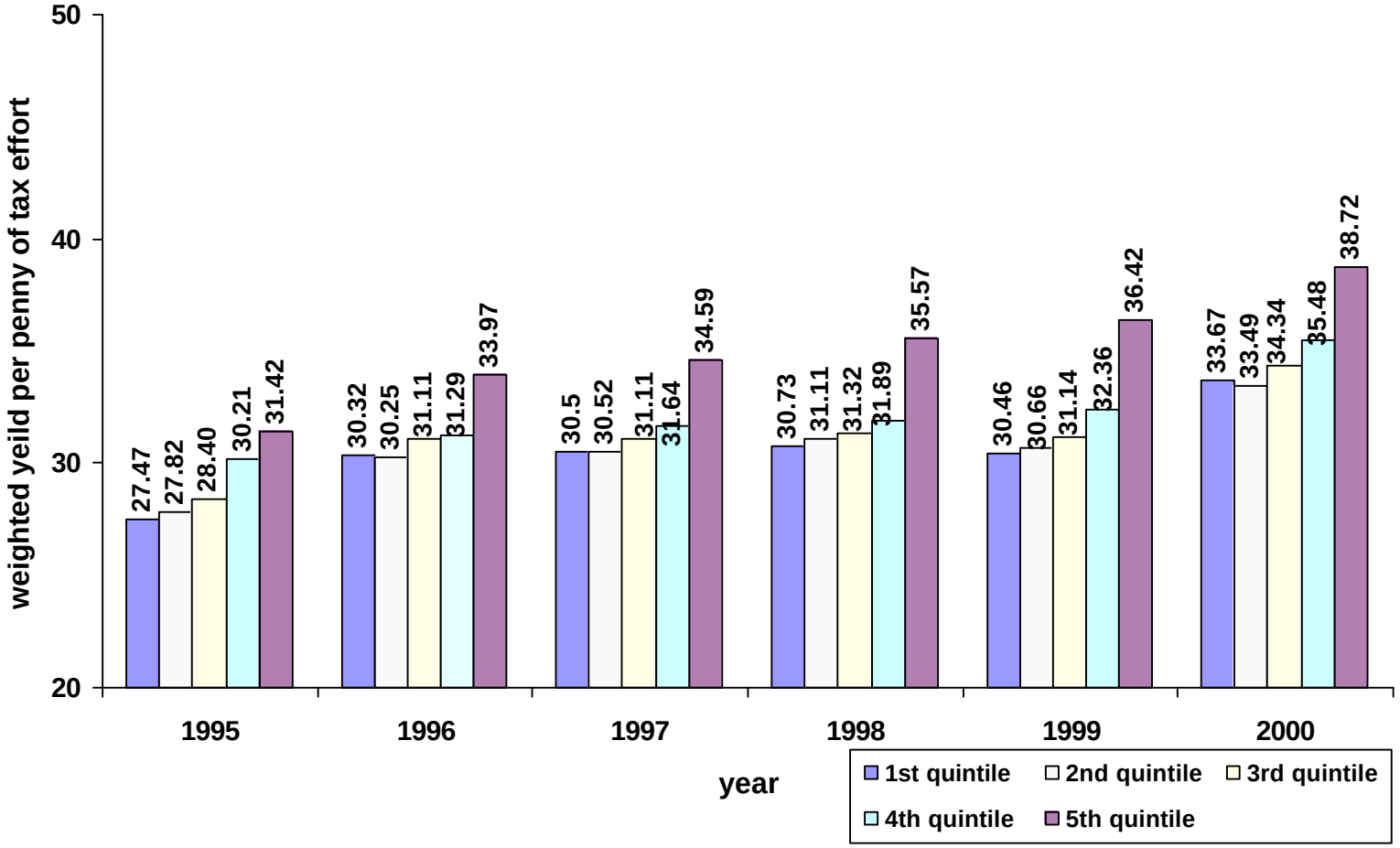
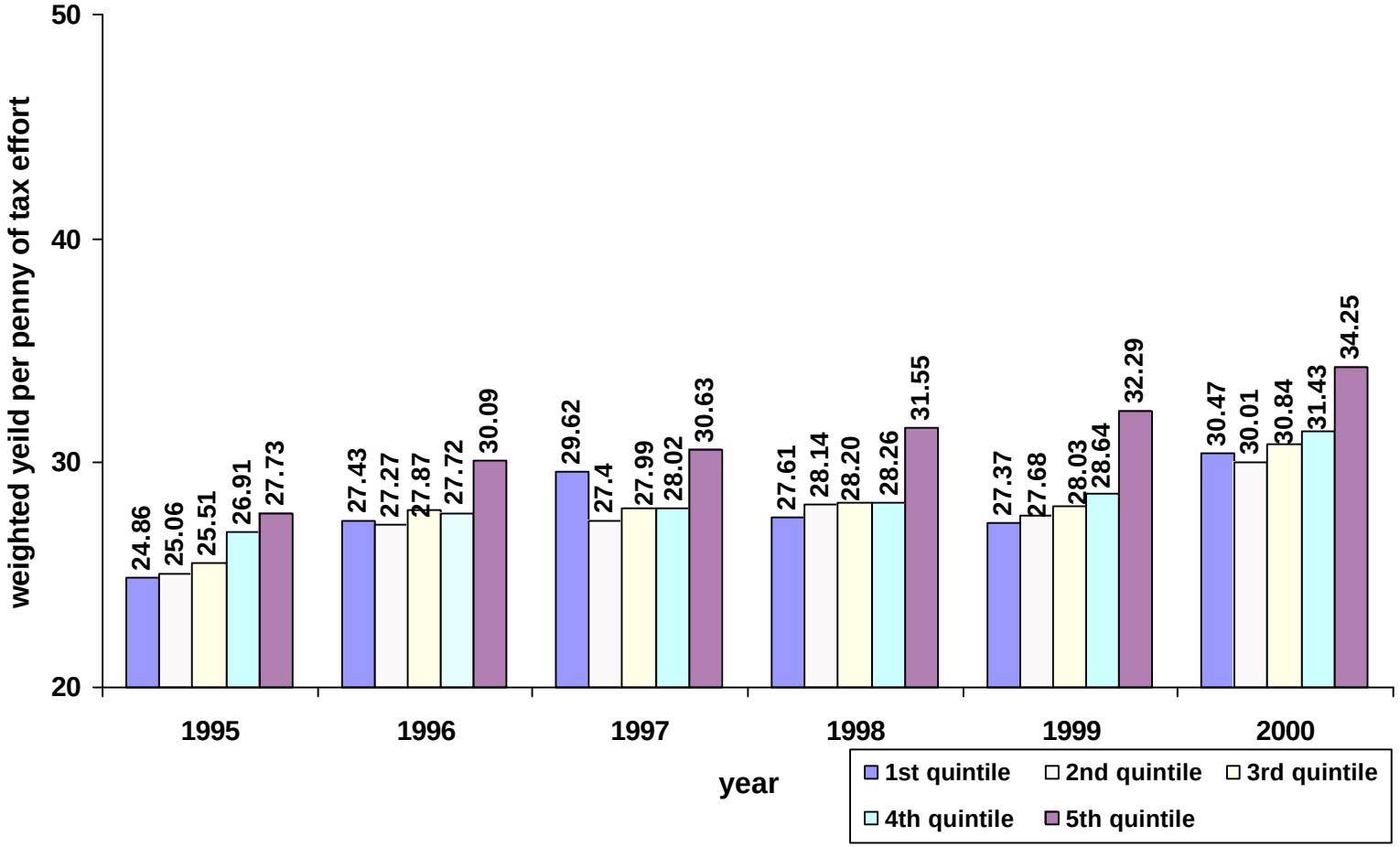


Figure 4. Cost adjusted and weighted yield per penny of tax effort: 1994-2000



Revenue Equity

How has revenue equity changed since Edgewood IV?

This section also addresses both horizontal and vertical equity. Seven commonly used equity statistics were employed to answer this question, and each sheds light on a different aspect of equity.

The simplest of these is the range. This difference between the lowest and highest observations in the data is extremely vulnerable to the effects of outliers, and this is indicated in table 11 below. In 1997, increasing property wealth in Valentine ISD resulted in their per pupil revenue skyrocketing from an already high level $11,241 in 1996 to just over $54,845 in 1997. This one district had a dramatic impact on the range in this year.

Table 11. Range of per-pupil revenue: 1995–2000

	1995	**1996**	**1997**	**1998**	**1999**	**2000**
Not adjusted	$23,035	$18,433	$51,369	$22,034	$18,170	$39,608
Cost adjusted	$21,700	$17,631	$49,260	$20,627	$17,661	$39,208
Weighted	$8,074	$8,222	$10,249	$10,335	$12,253	$19,485
Cost adjusted and weighted	$7,645	$7,785	$9,798	$9,756	$12,060	$19,300

The restricted range eliminates some of the impact of outliers by comparing observations at the 5^{th} and 95^{th} percentiles of the distribution.

However, these values are sensitive to the effects of inflation because as overall values increase, the distance between them is likely to increase as well.

Table 12. Restricted range of per-pupil revenue: 1995–2000

	1995	**1996**	**1997**	**1998**	**1999**	**2000**
Not adjusted	$1,732	$1,674	$1,700	$1,934	$1,713	$2,002
Cost adjusted	$1,548	$1,575	$1,727	$1,914	$1,712	$1,863
Weighted	$1,825	$1,596	$1,678	$1,858	$1,785	$2,000
Cost adjusted and weighted	$1,415	$1,349	$1,282	$1,556	$1,483	$1,697

By dividing the restricted range by the value at the 5th percentile, the effects of overall inflation can be removed. These federal range rations are reported below. The system appears most equitable when the adjustments for cost differences have not been applied, and the weighted figures that reflect differences in student need appear to have the greatest impact on equity.

Table 13. Federal range ratio of per-pupil revenue: 1995–2000

	1995	**1996**	**1997**	**1998**	**1999**	**2000**
Not adjusted	.3846	.3391	.3301	.3567	.3064	.3286
Cost adjusted	.3760	.3485	.3719	.3976	.3402	.3415
Weighted	.5278	.4194	.4275	.4508	.4254	.4400
Cost adjusted and weighted	.4431	.3854	.3522	.4148	.3821	.4088

A third measure of overall equity is the coefficient of variation. This value is obtained by dividing the standard deviation by the mean and it is often referred to as the percent variation around the mean. These values are consistently just

over ten percent, indicating that two-thirds of all Texas students were within between 10 and 13 percent of the statewide average revenue per pupil, depending on the year and the cost adjustments being made.

Table 14. Coefficient of variation of per-pupil revenue: 1995–2000

	1995	**1996**	**1997**	**1998**	**1999**	**2000**
Not adjusted	12.67	11.91	12.60	12.49	12.38	11.50
Cost adjusted	13.54	12.99	13.90	13.84	13.20	12.52
Weighted	12.71	11.35	11.18	11.68	12.10	12.13
Cost adjusted and weighted	12.16	10.85	10.84	11.39	11.70	11.46

The Gini coefficient is similar to the coefficient of variation in that it is an overall measure of equity. Gini values range from zero if the system is perfectly equitable, to one if all the revenue in the system were concentrated in one district—or if the system were perfectly inequitable. These values tend to be slightly higher when cost adjustments are made. Each year, the Gini Coefficient for cost adjusted revenue per weighted pupil was .06, indicating that in 94 percent of the cases, there were equal proportions of revenue for equal proportions of students (see Verstegen, 1987).

Table 15. Gini coefficient of per-pupil revenue: 1995–2000

	1995	**1996**	**1997**	**1998**	**1999**	**2000**
Not adjusted	.06	.04	.05	.06	.05	.05
Cost adjusted	.06	.06	.06	.06	.06	.05
Weighted	.07	.06	.06	.06	.06	.06
Cost adjusted and weighted	.06	.06	.06	.06	.06	.06

However, all of these general measures do not allow for assessing where in the system inequity exists. The Verstegen and McLoone indices enable one to isolate the equity measure to the top and bottom halves of the revenue distribution respectively.

The McLoone index examines revenue equity in the bottom half of the distribution by comparing the sum of all values below the median to the sum of all observations if they had the value of the median. In each year, the McLoone index is closer to one—the value representing perfect equity—than is the Verstegen index, suggesting that observations in the bottom half of the distribution are closer to the median than are observations in the top half of the distribution. When the adjusted data are used, the Verstegen index falls below .9 in several years, but the McLoone Index remains above this value each year. In 2000, considering cost adjusted revenue per weighted pupil, a McLoone Index of .95 indicates that 5 percent of the revenue of the median pupil (which was $4,660.77 in 2000). Given the ADA of 3,675,308 on which these analyses were based, roughly $428,244,132

would be needed to bring all pupils below the median value to the median level in 2000.[11] This comes to just over 3 percent of the state education allocation in 1999-2000.

Table 16. McLoone and Verstegen indices for per-pupil revenue: 1995–2000

McLoone	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Not adjusted	.9547	.9375	.9432	.9534	.9562	.9375
Cost adjusted	.9512	.9519	.9427	.9501	.9464	.9498
Weighted	.9275	.9293	.9325	.9398	.9439	.9360
Cost adjusted/ weighted	.9377	.9370	.9429	.9474	.9392	.9518
Verstegen	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Not adjusted	.9004	.8605	.9128	.9034	.9047	.9268
Cost adjusted	.8942	.8994	.9067	.8984	.9087	.9097
Weighted	.8992	.9124	.9135	.9012	.8918	.8940
Cost adjusted/ weighted	.8960	.9134	.9110	.9024	.9064	.8958

Equity of Outcomes

Research Question 3: How has the relationship between student performance and property wealth changed since Edgewood IV?

The third question relates to the impact of school finance reform on student achievement. The section presents descriptive statistics first, and then results for two separate regression approaches. The first examines the effect of property

[11] This was computed in the following way: (1.0-.95) * $4,660.77 * (.5 * 3,675,308).

wealth on student performance, holding students' socio-economic status constant. The second attempts to isolate the impact of low wealth by substituting a dummy-coded variable which is coded one if the district falls into the bottom quintile of wealth per student and zero otherwise.

Descriptive statistics

The variables used in this section are per pupil taxable property wealth per student, the percentage of students passing all sections of the Texas Assessment of Academic Skills, and the percentage of students identified as eligible for participation in the federal free-and-reduced price lunch program. Descriptive statistics for these three variables are presented in the tables below.

Table 17. Districts' percentage of third grade students passing all sections of the TAAS: 1994-2000

Year	Number	Mean	Standard Deviation
1994	1006	58.41	16.20
1995	1005	67.41	16.47
1996	1004	70.52	14.90
1997	1012	74.38	15.29
1998	1003	76.90	14.25
1999	1016	84.16	13.14
2000	1011	77.89	13.85

Table 18. Districts' percentage of fourth grade students passing all sections of the TAAS: 1994-2000

Year	Number	Mean	Standard Deviation
1994	1008	54.53	16.94
1995	1013	63.09	16.62
1996	1008	66.21	16.61
1997	1008	71.41	15.01
1998	1006	77.85	15.07
1999	1015	83.78	11.54
2000	1005	80.53	13.64

Table 19. Districts' percentage of fifth grade students passing all sections of the TAAS: 1994-2000

Year	Number	Mean	Standard Deviation
1994	1001	60.11	16.29
1995	1016	68.11	16.02
1996	1008	74.05	13.98
1997	1011	79.95	13.03
1998	1003	84.09	11.13
1999	1013	79.04	11.87
2000	1015	86.46	10.91

Table 20. Districts' percentage of sixth grade students passing all sections of the TAAS: 1994-2000

Year	Number	Mean	Standard Deviation
1994	1004	60.61	16.68
1995	1001	66.11	16.03
1996	1009	74.28	14.23
1997	1004	80.72	12.63
1998	1010	84.16	11.86
1999	1014	83.83	11.58
2000	1013	85.23	11.02

Table 21. Districts' percentage of seventh grade students passing all sections of the TAAS: 1994-2000

Year	Number	Mean	Standard Deviation
1994	989	61.19	16.64
1995	986	65.40	16.23
1996	991	72.69	14.37
1997	1001	80.04	12.54
1998	994	82.96	11.43
1999	1004	82.67	11.03
2000	997	83.49	11.10

Table 22. Districts' percentage of eighth grade students passing all sections of the TAAS: 1994-2000

Year	Number	Mean	Standard Deviation
1994	994	54.80	16.27
1995	992	50.48	16.56
1996	989	57.50	16.15
1997	987	61.29	15.59
1998	999	66.13	15.65
1999	999	66.52	14.53
2000	1003	68.63	15.43

Table 23. Districts' percentage of students eligible for participation in the federal free-and-reduced price lunch program: 1994-2000

Year	Number	Mean	Standard Deviation
1994	1031	44.87	18.41
1995	1045	45.56	18.61
1996	1029	45.81	18.61
1997	1030	46.61	18.73
1998	1030	46.74	19.03
1999	1031	47.16	19.04
2000	1030	47.42	18.99

Table 24 describes districts' taxable value per pupil. These values will differ from those presented in relation to research questions one and two because they are aggregated at the district, rather than student level.

Table 24. Districts' total taxable value per pupil: 1994-2000

Year	Number	Mean	Standard Deviation
1994	1031	$246,921.76	$469,932.77
1995	1034	$243,771.44	$463,174.50
1996	1029	$229,783.89	$413,789.44
1997	1030	$230,222.70	$401,606.33
1998	1030	$238,006.83	$418,625.45
1999	1031	$251,216.37	$455,568.32
2000	1031	$238,271.04	$398,629.05

Table 25 shows the average poverty level for districts as measured by the percentage of students participating in the federal free-and reduced price lunch program. The mean value has increased slightly over the past seven years.

Table 25. Districts' percentage of students eligible for participation in the federal free-and-reduced price lunch program: 1994-2000

Year	Number	Mean	Standard Deviation
1994	1031	44.87	18.41
1995	1045	45.56	18.61
1996	1029	45.81	18.61
1997	1030	46.61	18.73
1998	1030	46.74	19.03
1999	1031	47.16	19.04
2000	1030	47.42	18.99

The Multiple Regression Analyses

Two sets of analyses are used in this section. The first is a regression analysis of the percentage of students passing each section of the Texas Assessment of Academic Skills (TAAS) on property wealth per student, holding constant the percentage of students who are economically disadvantaged in each district. Table 26 provides the R^2 values for each year at each grade level.

Table 26. R^2 values for regression analyses of percentage of students on free and reduced price lunch program and property wealth on the percentage of students passing the TAAS: 1994-2000

	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
1994	.156	.182	.202	.205	.256	.233
1995	.143	.186	.212	.244	.269	.319
1996	.143	.129	.192	.283	.281	.285
1997	.136	.139	.177	.238	.272	.343
1998	.142	.117	.159	.210	.273	.304
1999	.078	.187	.145	.165	.171	.248
2000	.144	.147	.145	.174	.170	.213

Beta coefficients for the percentage of students participating in the free and reduced lunch program are presented in table 27.

Table 27. Beta coefficient for the percentage of students participating in the free and-reduced priced lunch program on the percentage of students passing all sections of the TAAS

	Grade 3	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**
1994	-.347*	-.387*	-.398*	-.391*	-.447*	-.422*
1995	-.342*	-.393*	-.390*	-.422*	-.451*	-.502*
1996	-.297*	-.315*	-.313*	-.402*	-.402*	-.459*
1997	-.291*	-.297*	-.286*	-.314*	-.342*	-.480*
1998	-.281*	-.264*	-.229*	-.274*	-.307*	-.442*
1999	-.192*	-.245*	-.240*	-.238*	-.266*	-.366*
2000	-.267*	-.270*	-.213*	-.227*	-.236*	-.367*

** indicates that values are statistically significant at the P<.05 level.*

Table 28 presents the beta-coefficients as measured by standard deviations of property wealth per student. In the lower grades, there is no statistically significant relationship between property wealth and performance except for a few individual years. However, grades six, seven, and eight consistently show positive and statistically significant relationships between property wealth and student performance. The strength of this association generally declines over time, perhaps suggesting that reform efforts had an impact first at the lower grades and is only now beginning to take effect at the upper grades. It is important to take into account the fact that the fourth and eighth grade tests are composed of more subjects than the other grade levels, and this probably resulted in increased difficulty with respect to improving performance at those grade levels.

Table 28. Effect size of property wealth on the percentage of students passing all sections of the TAAS

	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
1994	0.69	1.19	1.25	2.83*	1.77*	1.33*
1995	0.31	0.48	1.23*	1.25*	1.08*	1.15*
1996	0.95	0.91	1.96*	1.50*	1.63*	1.40*
1997	1.17*	0.39	0.96	1.92*	1.24*	1.71*
1998	0.58	0.94	0.97*	1.65*	1.18*	1.72*
1999	0.23	1.10*	-0.12	1.06*	1.36*	1.70*
2000	1.21*	1.24	0.78	1.60*	0.80*	1.12*

** indicates that values are statistically significant at the P<.05 level.*

A second set of regression analyses attempts to isolate the impact of low levels of property wealth. This analysis uses a dummy-coded variable of one for districts that are in the bottom quintile of property wealth and zero for all other districts. Table 29 provides the R^2 values for each year at each grade level.

Table 29. R^2 values for regression analyses of percentage of students on free and reduced price lunch program and low wealth status on the percentage of students passing the TAAS: 1994-2000

	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
1994	.155	.181	.199	.195	.257	.236
1995	.144	.177	.201	.237	.268	.310
1996	.141	.128	.183	.281	.272	.286
1997	.133	.139	.175	.232	.265	.336
1998	.142	.116	.156	.207	.268	.297
1999	.079	.182	.145	.165	.164	.240
2000	.142	.146	.143	.167	.170	.213

Beta coefficients for the percentage of students participating in the free and reduced lunch program are presented in table 30.

Table 30. Beta coefficient for the percentage of students participating in the free-and-reduced priced lunch program on the percentage of students passing all sections of the TAAS

	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
1994	-.349*	-.397*	-.401*	-.386*	-.435*	-.411*
1995	-.337*	-.386*	-.397*	-.421*	-.441*	-.499*
1996	-.304*	-.322*	-.322*	-.398*	-.401*	-.448*
1997	-.301*	-.302*	-.290*	-.311*	-.343*	-.477*
1998	-.288*	-.273*	-.229*	-.271*	-.304*	-.441*
1999	-.199*	-.260*	-.238*	-.235*	-.223*	-.364*
2000	-.281*	-.272*	-.216*	-.227*	-.230*	-.358*

** indicates that values are statistically significant at the P<.05 level.*

Results from this analysis demonstrate that there was already no negative impact associated with low property wealth in the third through fifth grades by 1994. This may be because students in these grade levels had come through an equalized school system. However, the sixth through eighth grade results show a negative association between low property wealth and student achievement in 1994, and this relationship generally weakens over the next seven years, although there is some fluctuation from year to year. These results are presented in table 31.

Table 31. The impact of low-wealth per pupil on the percentage of students passing all sections of the TAAS, grades 3 though 8

	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
1994	-0.149	1.258	-0.474	-3.165*	-3.993*	-3.588*
1995	-1.616	-0.099	-0.324	-2.266*	-4.118*	-2.612*
1996	0.377	0.440	0.114	-2.447*	-1.445	-3.490*
1997	0.868	0.559	-0.246	-2.308*	-0.731	-2.155*
1998	0.989	0.933	-0.819	-2.174*	-1.711*	-1.847
1999	1.171	-0.090	-0.299	-2.003*	-1.826*	-2.061*
2000	1.230	-0.702	-0.177	-1.741*	-1.908*	-2.764*

Summary of Results

The data indicate that *Edgewood* reforms have resulted in improved equity, both with respect to financial resources and achievement differences, although some inequity remains. Property wealth continues to be related to revenue generation at statistically significant levels, and analyses of yield per penny of tax effort indicate that property wealthy districts are able to benefit most from the current system. Revenue is more equitably distributed among Texas districts, especially when compared to analyses conducted prior to HB 72 reform efforts, but also when compared to analyses conducted in 1986, after those reforms had taken place. Analyses that do not take cost differences into account generally show more equity, suggesting that some districts are not able to generate sufficient revenue to make up for the higher costs they face. Finally, student achievement data indicate that property wealth is less associated with districts' academic performance, and this relationship has continued to weaken over time, beginning at the lower grades. This is especially true when the effect of low wealth status is isolated.

CHAPTER 5:

DISCUSSION

This chapter provides a discussion of the results, with respect to revenue equity, revenue neutrality, and student performance. It also presents both implications for research as well as a discussion of the limitations associated with the study.

Equity before and after Edgewood

Prior to the reforms that took place in the last two decades, property wealthy school districts had access to revenue that enabled them to tax at lower rates than their property poor counterparts while still generating significantly more resources. In 1985-86, for example, Texas' wealthiest district operated from a tax base of $14,000,000 of property wealth per student while the poorest had access to only $20,000 per student (Farr & Trachtenberg, 1999). Because of the state's funding system, these local differences in property wealth meant real differences in access to resources for school children. These differences have been highlighted anecdotally through the comparison of the neighboring districts of Edgewood ISD and Alamo Heights ISD.

The state responded to calls for enhanced equity through a series of reform efforts. One important effort took place after the *Rodriguez* case failed to overturn the state finance system in federal courts but succeeded in pointing out inequities

inherent in the system. In 1984 the Legislature enacted House Bill 72 which introduced a weighted pupil financing system aimed at improving equity. Verstegen (1987) examined the effects of this legislation on funding equity using several of the same equity statistics outlined in this report and found that improvements had been made.

She adjusted revenue based on both district and student level cost differences, and so the results most closely mirror the cost adjusted revenue per weighted pupil analyses from this report. In order to determine the effects of post-*Rodriguez* legislative changes, she compared the 1976 data to 1986 data.

Table 32: Equity Improvements: 1976, 1986, and 2000

	1976	**1987**	**2000**
Coefficient of Variation	22.5	15.9	11.46
Federal Range Ratio	.89	.48	.41
McLoone Index	.89	.93	.95

All equity variables used showed improvement over this time period. The coefficient of variation declined from 22.5 in 1976 to 15.9 by 1986. The cost adjusted and weighted coefficients of variation from this report had declined further by 2000 to a level of 11.46, suggesting that Texas continued to make gains in equity after HB 72 as the Texas Legislature responded to the *Edgewood* suits, but these gains were not as substantial as those made between 1976 and 1986.

Other equity statistics show similar improvements. The federal range ratio fell from .89 in 1976 to .48 in 1986, and then declined further to .41 by 2000. The

McLoone index grew from .89 in 1976 to .933 by 1996 and to .95 by 2000. Data from this report suggest that, although the system has improved with respect to equity, there are still some areas in which further ground could be gained. The Verstegen index, which measures equity in the top half of the distribution, falls below the typically acceptable level of .9 in two of the six years used in this study (1995 and 2000), suggesting that when differences in cost are accounted for, high wealth districts are still generating more revenue than their low wealth counterparts.

Analyses of revenue neutrality highlight similar issues. Property wealth is positively associated with revenue wealth at statistically significant levels every year between 1995 and 2000, regardless of how, or even whether, cost adjustments are made. Analyses of revenue yield per penny of tax effort further show that high wealth districts consistently generate more revenue than their low wealth counterparts, and this is also true regardless of how or whether cost adjustments are made. Since the regression analyses used in this report control for tax rates, these differences in revenue are not related to differences citizens' demand for high quality education, but to differential abilities to generate revenue due to differences in property wealth.

Although some inequity persists in the present system, analyses for this report, taken as a whole, indicate an improvement over the former system. The inequity that still exists is more prevalent in the upper half of the distribution of

property wealth, and tends to be more evident when cost adjustments are applied. These improvements in resource equity beg the question of whether they have translated into improved performance for those most helped by finance reform efforts.

A Declining Association between Property Wealth and Student Achievement

Although the degree to which Texas has produced dramatic gains in student achievement over the past decade has become somewhat politicized, there is evidence suggesting that Texas students have made at least continual and steady gains during this time period. This is certainly true with respect to the Texas Assessment of Academic Skills, on which only just under 56 percent of students managed to pass all tests taken in 1994 and just over 82 percent passed by 2001.[12] There is also some evidence suggesting that the state has made some, although significantly slower, progress on the National Assessment of Educational Progress (see Linn, Baker, & Betebenner, 2002).

However, determining which among the whole host of educational reform efforts that have taken place in Texas over this time period is responsible for these improvements is difficult. The advent of the Texas accountability system, which sanctions schools that fail to meet performance objectives in reading, writing, and mathematics, is certainly one possible cause for overall improvements in student achievement (see Grissmer, Flannagan, Kawata, & Williamson, 2000).

[12] See the Texas Excellence Indicator System available online at www.tea.state.tx.us.

The analyses in this report attempt to isolate the effects of finance reforms by examining their impact on those students who may have benefited most by it. Although the relationship between student achievement was weak in the lower grades even as early as 1994, a consistent pattern emerged in grades six through eight in which the relationship between property wealth and performance declines during the seven year time period over which this analysis was conducted. In the sixth grade, a low wealth status is associated with just over 3.2 percent fewer students passing the assessment in 1994, and only 1.7 by 2000. In grade seven the same figures drop from just under 4 percent in 1994 to 1.9 percent by 2000, and they drop from 3.6 percent in 1994 to 2.8 in 2000 for grade 8. These improvements, combined with the fact that no statistically significant effects were found at the lower grades, suggest that improvements in the availability of resources for property poor school districts has likely had at least some positive impact on student achievement over this time period. The fact that improvements seem to have come first among the lower grades and only later to the upper grades suggests that significant time must be allowed before we can expect to see the impact of new resources. We can easily imagine why changes in available revenue would not immediately manifest themselves in student test score improvements. Not only do educators need time to understand how best to use the new resources available to them, but student learning in one grade is always somewhat dependant on students' educational experiences in prior grades.

Flaws in the Current System

On the whole, these analyses indicate that the school finance reform efforts of the past decade have improved both equity of resources and equity of educational opportunity. However, a number of flaws persist in the current system if we expect it to maintain the ground that was gained after the *Edgewood* decisions, much less continue making progress. Issues of both equity and adequacy must still be addressed as we try to further raise our expectations for schools and students.

This year, 253 of Texas' school districts were taxing at the legal tax limit of $1.50 (Suydam, October 22, 2002), and we do not yet know how many more have reached this limit for next year. Additionally, a slow down in the economy could mean declining, rather than rising property values ahead. Writing in 1987, after HB 72 but before *Edgewood*, Deborah Verstegen said that "The dual problems of the rapidly increasing school population and an economic recession…bode ill for an optimistic appraisal for the future of Texas education finance equity." In spite of those concerns, the Legislature was forced to act as the result court decisions. With new challenges to tax limits on the horizon, this may be what will force action again as the system reaches capacity. However, the Legislature will have to proceed with caution if it is not going to lose ground gained with respect to equity as it attempts to address capacity.

Implications for Research

Several issues still need to be addressed with respect to assessing the effects of finance reform efforts. The equity analyses conducted in the first two research questions for this report point to the fact that using a system of weights that account for differences in educational need has an impact on the degree to which a system can be deemed equitable. If these are to be used both in the distribution of state aid and in conducting research, more work needs to be done establishing the true cost of educating students with differing educational needs. Similarly, if we expect the public to provide the resources that will be required as we try to meet new demands for increased graduation rates and higher levels of academic achievement for all students, then we need to improve our understanding of the resource required to meet those challenges.

The student performance component of this report suggests that their may have been a positive effect on student performance from increased revenue equity, but a significant time-lag occurred between policy changes and test score improvements. One would assume that multiple factors contributed to this lag, including time for districts to learn how to use resources effectively and time for students to progress through an equalized system. A better understanding of this process may enable educators to implement reform in a way that more quickly

impacts students. How we can induce a system to respond more quickly to changes in resources and changes state policy is an important question.

Limitations

This study was limited by several factors. First, the study is limited by the availability of data, especially the student performance data. The Texas Assessment of Academic Skills is a measure that focuses on minimum skills, and so performance gains at the upper end of the distribution are not detected, and this is especially true given that this analysis used the percentage of students passing the examination rather than overall scores.

Additionally, the finance reform efforts that are the focus of this study were accompanied in Texas by a host of other reform efforts including the implementation of a strong accountability system and the infusion of additional resources into education fueled, in part, by rising property values. It is impossible to definitively determine that changes in the relationship between student performance and property wealth were necessarily the result of changes in the finance structure.

APPENDIX

The weights used for this study are those used by the state, with the effects of the Cost of education index removed. Specific weights are provided below. This information comes from the Legislative Budget Board (2001).

Classification	Description	Weight
Small and midsized district adjustment	Designed to compensate for the higher cost associated with operating in a less populated area. Small districts have less than 1,600 ADA and midsized districts have between 1,600 and 5,000ADA	1.0 to 1.61
Sparsity adjustment	Eligibility based on the number of students in the district, the range of grades, the availability of a high school, and the distance to a district with a high school	
Special education	There are 12 classifications for special education instructional arrangements. Weights are based on the duration of services during the day and on the location of instruction	1.7 to 5.0
Compensatory education	Funding based on the number of students eligible for the free or reduced-price lunch program	0.2 or 2.41 if pregnant
Career and technology	Based on the amount of time students spend in eligible classes	1.37
Bilingual/ESL	Based on the number of students electing to participate in the program	0.1
Gifted / Talented	The number of eligible students is capped at 5 percent of the districts' ADA	0.12

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